

Kansas State Fire Marshal – Fire Prevention Division

References (s): 06-IFC/907; 00-101/9.6.2.10

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FIRE FACT 061 – SMOKE DETECTORS

The use of smoke detection in regulated facilities is becoming much more common. The Kansas State Fire Marshal's Office requires smoke detection in some specific regulated facilities and in all regulated facilities with sleeping occupants. We have also accepted smoke detection as a compensatory measure for some facilities not requiring smoke detection. This concept is based on the automatic early detection and notification of the occupants and their speedy evacuation prior to the exit way being obstructed by smoke.

SMOKE DETECTION: General

By definition and by design, smoke detectors respond to the solid and liquid aerosols produced by a fire. Each type responds differently to different types of smoke. Also, because they respond to aerosols from non-fire sources, an understanding of their operating characteristics is helpful in the correct selection and placement of smoke detectors to reduce the chances of false and nuisance alarms. Therefore, the selection of a smoke detector should be based on the type of fire and fuel expected, as well as on environmental characteristics of the area to be protected.

Smoke detectors are designed to detect smoke by one of two basic principles. They use either **ionization** or **photoelectric light** to detect smoke. Most detectors installed for use in the home or office fall into these two categories. However, there are some detectors that are available for special applications and specific uses. **The Kansas State Fire Marshal's Office will accept detectors using either of these principles.**

A smoke detector transmits an alarm signal either by sounding an internal alarm or by signaling a control panel. Most detectors encountered in field inspections fall into three general categories for sounding an alarm.

- (1) Single station detectors
- (2) Multiple station or interconnected detectors
- (3) Detection systems

Single station detectors: These detectors provide coverage for a single area and will sound an alarm from that one single detector upon activation. This type of detector is powered by battery or building power. These detectors are readily available to the general public and allow for installation by the homeowner or facility operator.

Multiple station or interconnected detectors: These detectors are powered by the building's electrical power supply and are connected together by an independent circuit. These detectors provide coverage for the multiple areas where detectors are located. All detectors connected in the circuit will sound upon activation of any one of the detectors. The application of this type of detection is limited to the size of the facility and to the number of detectors required. These detectors are available through qualified electrical supply dealers and installers.

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Detection systems: These detectors are connected to an alarm control panel. The activation of the detector incorporates the use of additional fire alarm horns or bells, and lights for notification. These systems also have manual pull stations to allow for occupant activation of the fire alarm. Many of the systems installed today include diagnostic features that provide critical information as to the function and status of each detector in the system. These systems are available through and are installed by registered fire alarm companies.

KSFMO Approval

The use of single station detection is allowed in some instances and must be approved and documented in writing by our office for the specific application prior to use.

The use of multiple station detection and detection systems to meet the requirements set forth in the Kansas Buildings Fire Safety Handbook shall require KSFMO approval. To obtain approval, copies of equipment cut sheets, floor diagrams (showing placement of detectors, fire alarm control panel, pull stations, annunciation devices, etc.), specification sheets (if available), and any other information relevant to the smoke detection system must be submitted to KSFMO.

Installation: We recommend that detectors be securely mounted on the ceiling of the area to be protected. They should be installed according to the manufacturer's instructions. They shall not be installed in direct airflow (i.e. vents, fans, or other air handling equipment that can create a dust buildup and cause smoke detector malfunction).

Maintenance: All detectors are required to be maintained for proper operation. It is the responsibility of the facility to document all monthly, annual, or semi-annual testing and maintenance records.

Documentation records shall be maintained on site and shall be kept readily available for review. These records should be kept by the facility owner/operator for a period of not less than five years.

Testing Frequencies:

Single-Station Battery Operated

- Monthly test

- Annual battery replacement

Detection Systems

- Semi-Annual visual inspection

- Annual test (part of annual fire alarm system test)

- Sensitivity test*

* Sensitivity shall be tested within 1 year after installation and every alternative year thereafter. The testing cycle may be extended to 5 yr intervals only if after the second calibration test all detectors remain within their listed range. At any point during the testing cycle, if 1 detector falls outside of its listed range, the detector must be cleaned and recalibrated or totally replaced. Additionally the testing cycle starts over with the 1st year.

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Battery Operated Smoke Detectors Testing Log

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